

The AMSAT[®] Journal

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January/February 2013

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How You Can Help Build New and Exciting Satellites

Donate to the President's Club

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US taxpayers may be able to receive a significant income tax deduction by making The Radio Amateur Satellite Corporation the owner and beneficiary of life insurance policies.

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US taxpayers should be able to avoid capital gains taxes on appreciated securities and receive a deduction for their fair market value.

Bequest

A codicil in your will, naming The Radio Amateur Satellite Corporation as a beneficiary will help insure the continuance of the Amateur Radio Satellite program.

Call the AMSAT-NA office at 301-589-6062 for questions on any or all of these ways you can help build new and exciting satellites.

Support AMSAT-NA

AMSAT Announcements

Straight Key Night on OSCAR 2013

Ray Soifer, W2RS

Since 1971, ARRL has held an informal "Straight Key Night" (SKN) on the HF bands every January 1st (UTC). In 1973, the weekly 75-meter AMSAT net happened to fall on New Year's Eve (January 1, 1974 UTC), and a few of us on the net said "Why don't we go on the satellite – there was only one in those days, AO-6 – with our straight keys?" SKN on OSCAR was born.

It became an annual AMSAT-sponsored event in 1992, and we began asking participants to nominate someone they worked for Best Fist. The first winner was Vic Politi, W1NU, who also holds Satellite DXCC No. 3.

Since then, OSCAR SKN activity has generally fluctuated with satellite activity in general. It's been down a bit the last

couple of years since the loss of AO-51, but an enthusiastic group of CW operators, and friends, look forward to SKN every year and wouldn't miss it. SKN on OSCAR 2013 was held in memory of one of those, John Thompson, W1BIH/PJ9JT, who passed away in 2012.

The following participants each received at least one Best Fist nomination: AA5PK, JM1LRA, JR0EFE, K9QHO, N5AFV, WA6ARA, WA6KBH, and WA7QXU.

If you haven't yet tried SKN on OSCAR, a fun experience awaits. See you next year!

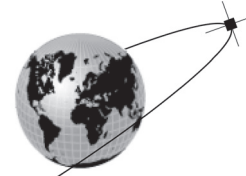
AMSAT's Mission

AMSAT is a non-profit volunteer organization which designs, builds and operates experimental satellites and promotes space education. We work in partnership with government, industry, educational institutions and fellow Amateur Radio societies. We encourage technical and scientific innovation, and promote the training and development of skilled satellite and ground system designers and operators.

AMSAT's Vision

Our Vision is to deploy satellite systems with the goal of providing wide-area and continuous coverage. AMSAT will continue active participation in human space missions and support a stream of LEO satellites developed in cooperation with the educational community and other amateur satellite groups.





A New Year

Best wishes for the New Year as 2013 is ushered in. Now is a good opportunity to update you on recent AMSAT happenings and look forward to the future....

AMSAT Journal

The 2012 issue was mailed in December under the leadership of our new editor, JoAnne Maenpaa, K9JKM. As I write this column in mid-January, I expect this issue (JAN-FEB 2013) will be mailed to the AMSAT membership in mid-February, returning *The AMSAT Journal* to a timely production schedule. We also expect that the next issue (MAR-APR 2013) will be mailed to our members on schedule in mid-April. JoAnne brings an extensive organizational ability as well as enthusiasm and motivation to produce a top-notch magazine. As she gains experience in the creation of *The AMSAT Journal*, I expect that she will not only be enhancing her new team, but encouraging people to produce materials for inclusion. Our ability to provide a magazine is dependent upon having articles to publish. If you have an idea for an article, please contact JoAnne and she will help guide you through the submission process.

In my previous "Apogee View" column I stated that due to only one issue of *The AMSAT Journal* with a 2012 issuance date (instead of six issues), we would be providing copies of the Proceedings of the AMSAT-NA 30th Space Symposium and AMSAT-NA Meeting, to AMSAT members which took place October 26-28, 2012 in Orlando, FL on CDROM. My hope was that the distribution would take place by the end of 2012. That did not happen, but the DVD, created by Dan Schultz, N8FGV is at the production facility and will be completed by the end-of-month. I expect that members will have their copy in mid-February.

This CDROM is the result of Dan's efforts to create an easy-to-use document retrieval process. We are also using a new provider to produce the CDROMs. All of this effort took more time than originally expected. I trust you will be pleased with the results.

AMSAT Membership

A reminder that Martha sends out renewal notices in advance of expiration of your membership. Please renew either by returning the notice and enclosing payment, or you may use the AMSAT Store. In

either case, it helps us considerably if you renew promptly. With the delivery of the "Symposium" CDROM in February, all 2012 AMSAT members will be caught up with what they were entitled to their 2012 membership. Now we move forward.

A related request is to help us recruit new AMSAT members. As I noted during the AMSAT Membership Meeting in October, overall membership has been on the decline for the past 4+ years and it has reached a point where membership receipts no longer cover operating costs of the Corporation. In other words, given the current number of regular members, our expenses may exceed the annual dues received which might force us to occasionally dip into reserves to keep the organization functioning (salary, office rent, utilities, etc.). If this happens, this means that over time a significantly financially-weakened organization may occur. Donations made for specific projects, such as Fox-1 cannot be used to cover operating expenses. Clearly, it is very important that we get our membership rolls increased.

If you know people locally, such as members of amateur radio clubs, who are interested in operating through amateur radio satellites, or may be attracted to the significant engineering work done by our volunteers, or think that an all-volunteer organization that designs, builds, and operates amateur radio satellites is pretty amazing, then ask them to join AMSAT. Their dues will entitle them to *The AMSAT Journal* so that they may be kept abreast of developments as well as help to maintain the organization's long-term health. Membership is the lifeblood of any organization, both in terms of serving as a corps of volunteers as well as providing basic financial support.

ITAR

The US Congress passed the National Defense Authorization Act in December which included an amendment authorizing the President to transfer satellites from International Traffic in Arms Regulations (ITAR) to the Department of Commerce Export Administration Regulations (EAR). ANS-365 Bulletin released on 29 DEC 12 provides some of the legislative details. The President signed the bill on 3 JAN 13.

continued on page 4 ...

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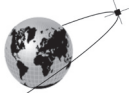
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The AMSAT Journal staff is always interested in article submissions. Whenever possible, submissions should be sent via e-mail to journal@amsat.org using plain text or word processor files; photos or figures in TIF, GIF or JPEG formats. Kindly do not embed graphics or photos in your manuscript - we prefer receiving those as separate files. AMSAT-NA reserves the right to select material for *The AMSAT Journal* based on suitability of content and space considerations. The editors of this publication are volunteers giving freely of their talents, time and efforts to produce *The AMSAT Journal*.





This is a significant milestone, which when fully implemented would allow AMSAT to once again collaborate with international partners on technical matters pertaining to satellite design and construction. While the physical shipment of satellite-related items would still require an export license, EAR does not recognize technical exchanges as being “deemed exports” and thus subject to restrictions in the free exchange of information. Thus, US citizens would once again be allowed to collaborate on international amateur radio projects, as we once participated in prior Phase-3 satellite programs.

While President Obama has signed the bill, there is still a number of steps to be taken before actual implementation will take place. AMSAT Congressional Liaison Peter Portanova, WB2OQQ spoke with the Director of Policy of the Satellite Industry Association, who noted that the bill must now be subjected to the Regulatory process, wherein the Department of State and Commerce must draft a proposed rule. The rule is then subjected to a public comment process. At this point it isn’t clear how long it might take the Regulatory Agencies to draft the proposed rule, but his experience suggests that it might be ready by the fourth quarter of 2013. Once public comments are received, the process continues, including release of the final rule. Presumably, this process will extend into 2014.

Peter notes that when the proposal is published in the Federal Register, AMSAT should file comments on how we interpret the proposed rule to be certain that the draft covers our equities.

Until there is indeed a change in regulations, AMSAT will continue to function under ITAR. We look forward to revisions to the legal environment which will allow us to potentially collaborate with our international partners on engineering projects in the future.

Support for AMSAT

A letter was sent to the AMSAT membership in early December highlighting a “matching fund challenge” as part of our end-of-year donation campaign. Many of you responded to our appeal, and your support is gratefully accepted. I am pleased to note that we received \$27,000.00 in donations in December, which means the \$25,000.00 challenge established by our benefactor has been met.

That said, as AMSAT continues to develop satellite projects we are always looking for the funding necessary to make these opportunities a reality. We expect to hear in February 2013 whether our ELaNa launch opportunity request has been accepted. We continue to look for other opportunities to partner with universities whereby they provide the scientific payloads that provide the justification for launches and AMSAT provides the space frame and RF infrastructure necessary for a successful science mission with the ultimate objective of providing an amateur radio platform. In some cases the science and amateur radio activities co-exist, such as with Fox-1 and the proposed Fox-1B. In the future, we may see opportunities where the science payload, due to higher downlink data requirements, has priority for the first year of operation and then once the science mission is completed, it transitions to an amateur radio satellite. Flexibility in terms of mission design and spacecraft capabilities will permit AMSAT to take full advantage of future missions towards keeping amateur radio in space.

As previously noted, your membership dues are used to cover the day-to-day expenses of the organization; dues are not used to cover satellite projects. Given our lowered membership base, this distinction is even more critical as we keep designated accounts for donations made for supporting satellite projects versus receipts from membership dues, proceeds from donations made for AMSAT merchandise, etc. which are applied to operating expenses.

Looking Down the Road

The beginning of a new year provides an opportunity to look at the calendar and think about upcoming events. For AMSAT, there are several items worth keeping in mind...

- We expect to hear from NASA sometime in February whether our ELaNa (Educational Launch of Nanosats) proposal has been accepted. Our proposal was submitted in November 2012 and discussed in my previous “Apogee View” column.
- Dayton Hamvention is the weekend of May 17-19. If you’ve never been to Dayton, please think about attending. This is the signature amateur radio gathering of the year, and once again AMSAT will have a major exhibit, the AMSAT Forum, the Thursday evening informal get together, and the joint AMSAT-TAPR Dinner on Friday evening. Please

come see us if you’re at Hamvention.

- At this point we have not been notified of a launch vehicle assignment for Fox-1. Our Engineering Team is working on a project schedule that presumes a Fourth Quarter 2013 launch opportunity and work continues on that basis. A key consideration is the availability of a launch that will provide the orbit that meets our needs.
- The 2013 AMSAT Space Symposium and Annual Meeting takes place this Fall. Details are being worked out. In February, we expect to announce the location and dates of the Symposium that will be highlighted in the next issue of *The AMSAT Journal*.

AMSAT Store

The latest item now available is a broadband pre-amp designed by Mark Spencer, WA8SME that is suitable for use with handheld HTs and handheld antennas. The preamp was highlighted in the November/December 2012 issue of *The AMSAT Journal* in an article that Mark wrote (“An Inexpensive Broadband Preamp for Satellite Work”, p.4) that provides the technical details. In a “sidebar”, Mark Hammond, N8MH provided comments about the performance of the preamp based upon his testing and including recommendations on how to incorporate the preamp into a station given that the device does not include RF switching.

Mark, WA8SME serves as ARRL Education & Technology Program Director and he initially built and provided to AMSAT 50 units which subsequently sold out. Mark is building more units, so check the AMSAT Store concerning pricing and availability. Net proceeds from the purchase of these units are dedicated to the Fox-1 project, so here is an opportunity to obtain a really useful device and support Fox-1.

73,

Barry A. Baines, WD4ASW
President



Kline School had the distinction of being invited to contact Commander Kevin Ford aboard the International Space Station on Thursday, December 6 via an ARISS contact.

During this live event, students had the opportunity to have their questions answered by an astronaut living in space. In preparation for the ARISS contact, students engaged in NASA class lessons on Building the ISS and What Life is Like Aboard the ISS. They studied experiments and tasks taking place on the ISS to help formulate expedition related questions. Students also learned about the forms and sources of energy that help to sustain the station.

Teachers at Kline School wrote, "We think of the ARISS contact as the real world application of our students' studies of science, technology, engineering and math (STEM)".

Reaching beyond content, students launched a Spell-A-Thon and raised \$6,500 to purchase six-sets of solar panels to help AMSAT fly Fox-1, an amateur radio satellite. The solar panels will provide power to the satellite while in space. Students are proud of their AMSAT membership, too.

An Out of this World Experience is not new to Kline School. Back in July 1994, former Kline School parent, Doug Borcoman (K6KDB), was instrumental in arranging communication with Commander Bob Cabana and Astronaut Don Thomas while the Space Shuttle, STS-65, was orbiting in space. Mr. Borcoman reconnected with Ms. Kline and together with the school's science teacher, Sean Butler, they arranged this event.

What makes this communication unique is that Kline School's first contact on July 15 and July 19, 1994 was when space enthusiasts were celebrating the 25th Anniversary of the Apollo 11 moon landing. The December 6 ARISS contact commemorated the 40th Anniversary of the last Apollo Mission to the moon which launched on December 7, 1972. In addition to a question and answer period (Q&A) with students and the ISS crew member, graduates were invited to share how the 1994 radio communication impacted their lives.

ARISS is a cooperative venture of the National Aeronautics and Space Administration



(above) To show their appreciation for this out-of-this-world experience, Kline School students organized a Spell-A-Thon to benefit the AMSAT Fox-1 Project. Twenty-three students collected pledges from sponsors and participated in a 100- word spelling bee. For every correctly spelled word a donation was made and the results were astounding! Students are proud of their work and their \$6,500 gift toward AMSAT's Fox-1 Project!

(right) Poster of Kline School Calling the International Space Station.

(NASA), the American Radio Relay League (ARRL), the Radio Amateur Satellite Corporation (AMSAT), and other worldwide amateur radio groups and international space agencies. These ARISS partners organize scheduled 10-minute interactive contacts via amateur radio with the help of experienced amateur radio volunteers.

For more information about Kline School's ISS contact and related events visit <http://www.klineschool.com>.



Mark Spencer, WA8SME

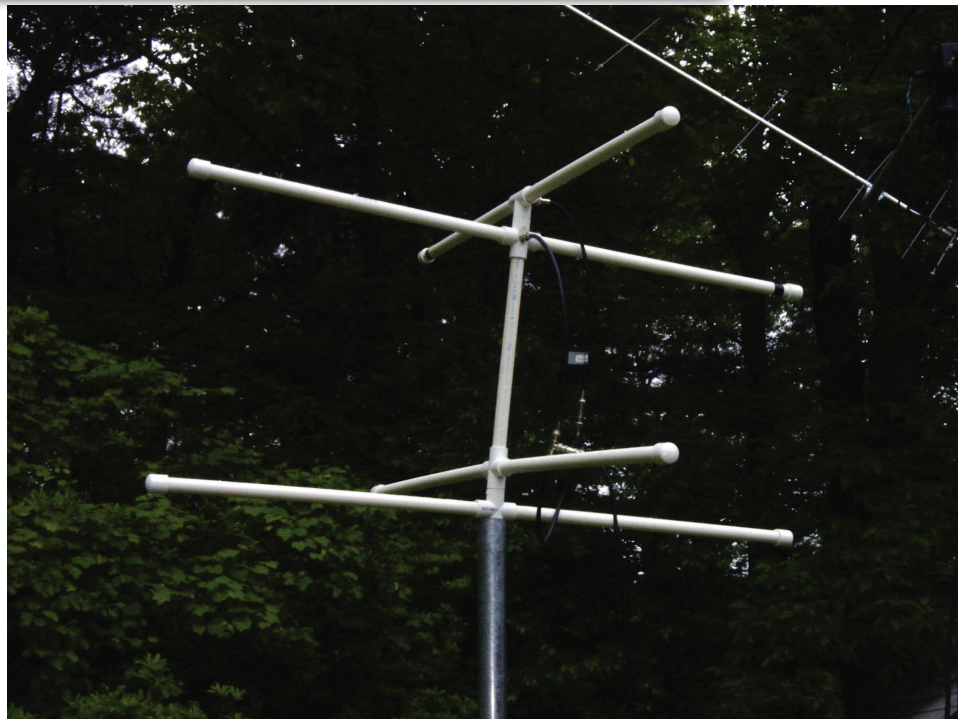
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Before I report on the results of a performance evaluation I did on a simple turn-style antenna design that is an affordable, home-brew satellite antenna project that can be used for receiving ARISS and future Fox-1 transmissions, please indulge a somewhat lengthy introduction.

I am an avid believer that bringing space technology into the classroom is an exceptional learning opportunity for our students, and it is becoming more important every day. There are however a number of challenges we face in integrating space technology (satellites) into today's classroom. First, using satellites is not a trivial activity, it covers and connects so many different content areas that it takes a concerted effort to use satellites in the classroom. Arguably, this might be a challenge, but on the other hand, this is exactly why satellites in the classroom can be an exceptional learning experience. Second, teachers teach the way they were taught, and teachers teach what they are most familiar with. Few teachers, if any, have been exposed to the use of satellite technology in the classroom during their formal teacher preparation courses, therefore they have a steep learning curve of their own to be prepare to integrate satellites into the classroom. Third, there is currently a dearth of "usable" satellite signals available for classroom use. While we enjoy QSOs on the birds, after the initial "WOW" factor (if there was one) of the first demonstrated of exchanging call signs and grid squares wears off, or after the 9 minute question and answer session during a scheduled ARISS contact is a distant memory for the students, the QSOs do not have sustained educational value. Probably the most valuable signals from space currently are the telemetry signals, however, it takes a talented teacher to not only facilitate the reception of these signals but also to instruct the students to exploit these signals and glean some meaning from them. Finally, the perceived cost of a satellite ground station can be intimidating to a school administration trying to wring blood out of public budgets.

The first and second challenges are being addressed as best we can through teacher in-service training programs and by each of you who support your local schools with satellite demonstrations and talks, or mentor your local school for an ARISS contact. There are no easy fixes. The third challenge is being addressed with



The article on this turn-style antenna can be accessed at: <http://www.arrl.org/files/file/ETP/ISS%20Minimal%20Antenna/ISS%20Minimalist%20Antenna%20article.pdf>.

each planned satellite launch in the future, including AMSAT's Fox constellation of CubeSats. The final challenge, cost, is the reason why I am writing this. The purpose of this paper is to quantify the performance of a simple, affordable antenna that can be used to allow schools to access signals from the ISS for instructional purposes, mainly to control robots via commands relayed through the APRS packet system on the ISS (the MAREA concept) and also to prepare schools to receive the telemetry from Fox-1 and the Attitude Determination Experiment.

In the on-going quest to demonstrate that space can be accessed affordably, I published an article that describes what I dubbed the "Minimalist Antenna" and also an article on the "Minimalist Preamplifier."

What I like about this antenna is that it can be built with simple hand tools, the parts are available from your local home improvement stores, and it is one component of the satellite ground station that can be built by the students, giving them a sense of ownership and maybe some home repair skills that will be useful in the future. But aside from my anecdotal experience that the antenna works, I wanted to quantify just how well it works.

For this study, I set up a procedure to use the packet transmissions from the ISS. When the ISS is in the packet mode, there are generally enough discrete transmissions that

can be used to test the reception probability. It is also convenient that the 2-meter downlink is also the band that will be used for Fox-1 telemetry in the future. So if the signals received via the minimalist antenna are of sufficient quality using the ISS, then there is a good probability that they will be of sufficient quality when trying to receive Fox-1. But the question remains, what does "sufficient quality" mean? I set up two stations to do the test as detailed in Table 1.

I ran these two stations simultaneously during a number of ISS passes. At the end of the pass I compared the number of decoded packets between the two stations. I used the primary station collection as the reference because that station setup is about as good as it gets (affordably), so I consider the primary station configuration the goal of a school program. The comparison is simply the percent (ratio) of the number of decoded packets from the secondary station with the minimalist antenna with respect to the decoded packets of the primary station. The data points were graphed as a function of the maximum elevation of the pass in Graph 1. The solid line is a plot of the minimalist antenna gain as a function of elevation. The scatter plot points are the ratios of decoded packets. The dashed line is a linear curve fit of the scatter plots to emphasize the trend.

As can be seen from the trends of the graph, about 70% of the decodable packets were decoded using the station with the minimalist

antenna across the spread of usable ISS passes. It is up to you to determine if 70% is sufficient quality or not, but in my view, this little experiment validated what I had observed anecdotally. Schools wishing to use the ISS packet system will be able to get a majority of their command sets through the ISS to their robots. For schools collecting data from the Fox Attitude Determination Experiment, there should be sufficient reliability of data collection during a pass to get fills and complete a whole orbit data set for analysis.

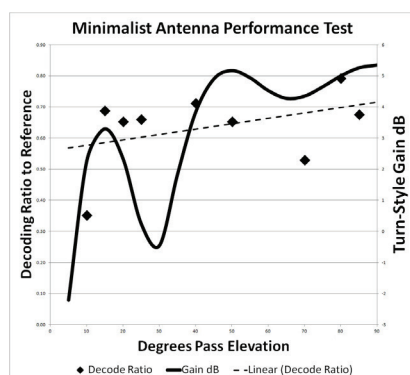
The bottom line is that the minimalist deserves some consideration when constructing an entry level ground station to use signals from the ISS now and in the future the Fox birds. You can expect credible results with low cost. Perhaps the results from this entry level antenna set up will stimulate upgrades to higher performing antennas to achieve virtual 100% collection.

In closing, and as an aside, one of the stresses schools face when preparing for an ARISS contact is that it is a challenge to test their

station set up before the actual contact day. There are few opportunities to contact the ISS outside of the scheduled ARISS contact, and there are few satellites with the VHF downlink, in a similar equatorial orbit, to do a parallel check of station performance. It is sort of like going to the championship game without any practices. But the schools can use the ISS packet signals to do some testing. The same radio on the ISS is used for voice and packet. Consequently, if a school can receive and decode a significant number of APRS packets transmitted by the ISS, there is a good probability that they will be able to receive the voice signals from the ISS while monitoring an ARISS contact. A better test would include “pinging” some packet beacon transmissions through the ISS and see how many are received and retransmitted from space. Granted, there is going to be some unseen competition for the bandwidth from packet co-users over the horizon that will not be there for the scheduled ARISS, but this test will give the schools some practice (scrimmage) activities before the “Bowl” championship ARISS contact. 🌐

Primary Station	Secondary Station
IC-910	FT-817
Sat-CAT control with SatPC32, 100 Hz refresh	Sat-CAT control with SatPC32, 100 Hz refresh
M*2 2MCP14 14-element RHCP Yagi 10.2dB	4-element turn-style RHCP about 5dB
14 feet AGL	8 feet AGL
ICOM antenna mounted preamp	Minimalist broad band preamp
Full AZ/EL control	Fixed pointing up
100 feet ½ inch hard line coax	40 feet RG8 mini coax
AGWPE and UISS TNC and display software	AGWPE and UISS TNC and display software

Table 1: Comparison of the two station configurations used for testing.



Graph 1: Comparison of the percent (ratio) of the number of decoded packets from the secondary station with the minimalist antenna with respect to the decoded packets of the primary station.

A 5-Minute Author Guide for The AMSAT Journal

It's easier to write for *The AMSAT Journal* than you might think. While a well-written submission is easier for our editors to deal with, your work doesn't have to be perfect. Write your article as best you can and our editors will work with you to get your item in print. Pick a topic that you're passionate about and just start writing! *The AMSAT Journal* welcomes your articles.

We look for technical articles related to satellite operations:

- Antenna systems
- Methods of data communications
- Software applications
- New satellites
- Satellite tracking or other technical satellite projects

We also look for news about satellite-oriented operating events:

- Special event stations working the satellites including Field Day and SKN
- ARISS
- Satellite operating awards
- International satellite operations and projects and Satellite DX/Dxpediton operations
- Anything of general interest or fun to hams operating on satellites.

Our editors work primarily in the usual Microsoft Word and text editors we are capable of reading other word processing formats as well. RTF and OpenOffice formats work well too. Our editors will send you a proofreading copy to make sure no special characters were changed or dropped.

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Once you have written your article you can e-mail your manuscript to journal at amsat.org as file attachments.

Refer to the full author guide on-line at: <http://tinyurl.com/AMSAT-Author-Guide>



Simple Roof Rafter Template

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With the increasing impact of homeowner associations, the personal desire to maintain a clean outward appearance of homes, and the desire to avoid having to install lightning arrestors and ground wires, more and more amateur radio operators are moving their satellite antenna systems into their attics. While there are increased losses trying to receive and transmit through the roof, at least the equipment is in a weather proof environment, access is available 365 days a year, and new low-noise preamplifiers counterbalance the losses. I use shelves hanging from the attic rafters to mount small antennas covering from mid VHF (100 MHz) to as high as X-band (10.5 GHz). Shelves are also useful for supporting preamplifiers, associated power supplies, and band pass filters. Also, many of us store less often used items out of the way in the attic. Shelves do take up more space than just stacking boxes, but the access to the individual boxes is much improved with the shelving.

I support the shelves with multiple wooden "U" shaped frames attached to the rafters. The frames do not extend all the way to the floor to allow wide boxes or gear to be placed under them and access for the occasional sweeping. Since the roof has a slope, the two legs of the U frames are not of equal length and the free ends of the legs are not cut square, but should match the roof slope. Sure, I can, and did at one time, measure the needed leg lengths and calculate the slope of the cuts, but the work was tedious, I kept losing the measurements, and I was often ending up with less than optimum looking legs. What I needed was a template. One end of the template would be cut to match the rafter slope and the other would be parallel to the attic floor. But, not all roofs have the same slope and many houses have roof sections of differing slopes. My house, breezeway, and garage each have a different slope. Then I hit upon an idea on how to make the template(s) quickly, accurately and with no calculations.

All the pieces and tools ready to be taken up into the attic are shown in Photo A. I typically start with a square or rectangular



Photo A - All the pieces and tools



Photo B - Panel and bar clamped to a rafter. The bottom panel edge is against the inner roof surface. The angle aluminum has been leveled.



Photo C - Completed and labeled template

panel of thin plywood, press board, aluminum, well used rack panel or even the sheet metal side or top panel from a discarded microwave oven. I avoid using heavy cardboard which I find lacks durability. For the example in this article, I used an aluminum panel salvaged from a discarded enclosure. The majority of purchases I make at a hamfest are for the enclosures and/or hardware. The panel edges need not be parallel or perpendicular. Only one edge, the bottom edge, must be straight. For my uses, I find a width of 16 inches to 24 inches is good. The panel for the example is 16.25 inches wide. I clamp the aluminum panel to a rafter with what will become the bottom edge against the inside surface of the roof using the larger pair of C-clamps. Then, a section of angle iron or aluminum, a yard stick, or just a piece of straight wood is clamped against the panel using the pair of smaller C clamps. I typically use a section of angle aluminum. With the bubble level sitting on top of the angle aluminum, the small C-clamps are loosened enough to allow me to adjust and level the angle aluminum. Once leveled, the angle aluminum is firmly clamped to the panel, see Photo B. The large C-clamps are then released and the panel, with the angle aluminum still clamped tightly, is taken downstairs. Once back down into the workshop, I mark the position of the angle aluminum using a felt-tipped pen and release the last of the clamps. The next step is to trim the aluminum sheet on my bandsaw and smooth the cut edge with a disc sander and a little hand filing. The last step is to label the bottom edge, front and back, with vinyl lettering, or the felt-tipped marker, and apply a protective spray coat of clear enamel. One face of the template is used for rafters on one side of the roof ridge and the panel is flipped over so the other face of the template can be used for rafters on the other side of the roof ridge. A preexisting or new hole in the panel is used to hang the template on the attic wall for storage. The completed template is shown in Photo C.

A framing square can be used to line up adjacent U frames. Alternately, I align a series of U frames using the edges of the plywood sheeting that makes up the under surface of the roof as a guide. The U frames are clamped in place and the mounting holes are drilled through the rafters. I use a single 3-1/2 inch long 1/4-20 carriage bolt,

flat washer and elastic lock nut to hold each leg of a U frame in place. Last, the shelving board is laid in place. Screws or nails are not needed to hold the shelving boards in place which allows the shelves to be removed for quick and easy access behind the shelves. A set of cut and drilled U frames with a shelf board ready to go into the attic are shown in Photo D. One installed set is shown in Photo E.

I can now layout and cut the necessary angles for a U frame in mere minutes and feel confident they are correct. I find that being able to complete a task with respectable results in a short period of time reduces the tendency to put off doing the task. Reducing the time working or searching for items stored in my attics during the summer is particularly appealing to me.



In the AMSAT Store ...

<http://store.amsat.org/catalog>

2012 AMSAT Fox Tee shirt. Sand colored tee with Fox logo and CubeSat image across the front.



Photo D - Cut U frames ready to go to the attic

Photo E – New shelf installed in the attic - ready for your antennas or radio gear.



John Papay, K8YSE had a unique experience on Easter Sunday, when he got the opportunity for an eyeball QSO with Captain Yuri Bodrov, UT1FG/MM aboard the MV Barnacle traveling from Thunder Bay, Ontario, Canada on Lake Superior en route to Puerto Rico via the Great Lakes and St. Lawrence Seaway.

Yuri activated wet grids as UT1FG/MM operating from the MV Barnacle as he sailed the seas between Europe, South America, the Caribbean, and North America. On a prior sea voyage Yuri captained the MV Mottler on a similar sea voyage when many first met him operating on the air via the amateur radio satellites. He is the Captain of the state-of-the-art seagoing vessel with 10,000 horsepower plant.

John had an idea that he could drive from his QTH to watch as the MV Barnacle passed through the Welland Canal connecting Lake Erie and Lake Ontario. The ship would have to pass through eight locks which might put John and Yuri within shouting distance.

On Saturday night John and Yuri chatted on 144.200 sideband as the MV Barnacle sailed from the Detroit River and across Lake Erie en route toward Lake Ontario. Yuri estimated his arrival at the Welland Canal would be around 0800. John hit the road from his QTH at about 0315 Sunday morning, passed customs to enter Canada and then drove to the Lake Erie entrance to the Canal.

Sunday morning John met up with Kevin, VE3RCN/VA3OR in Port Colborne, Ontario. Radio contact was established with Yuri on 146.520 MHz. The ship came in sight along the Lake Erie shore. John and Kevin were within waving distance. As the MV Barnacle entered Lock 8 the shore party was close enough to talk with Yuri aboard the ship.

As the ship cleared the lock John and Kevin lost contact for a short time. They were able to catch up with Yuri at the next lock. As the new Canal Pilot was boarding ship John got an invitation to come aboard. John boarded as the ship lowered to the dock level. He told what happened next, "A minute later I was on the bridge with Captain Yuri UT1FG. Finally I was able to meet a guy that I've been working on the satellites in hundreds of water grids since April 2009!"

A tour of the ship included a visit to Yuri's cabin, one level below the bridge. His quarters are quite nice and private. This is where he operates with his IC706, manually tuning the radio and doing a great job at that! The power supply from HP1CQ sat on the table in the corner and a computer running Orbitron is on the other side.

Yuri now has an ELK antenna installed (thanks to the efforts of Rick, WA4NVM). It is mounted on a manually rotatable mast that goes up from the bridge, starboard side, directly above his cabin. The ELK is tilted up at 15 degrees and was just installed on the way back from Thunder Bay. A CJU antenna is mounted on the crossboom next to the ELK. A vertical for 2 meters is on a separate mast above those antennas. Until this season Yuri only used the 2 meter vertical for transmit and receive. The CJU improved things greatly and the ELK takes it

to a new level. Yuri plans to install SatPC32 when he has more free time on the open sea; passing through the St. Lawrence Seaway keeps him and his crew very busy.

John said he sailed with Yuri until Lock 2 where it was time to get back ashore. Kevin, VE3RCN/VA3OR and his XYL Donna, VE3WIZ were waiting and gave John a ride back to his car, 30 miles away in Port Colborne.

John wrote, "I want to thank Kevin VA3OR/VE3RCN and his wife Donna, VE3WIZ, for spending their Easter Sunday hosting my visit to the Canal. I'm sure they had better things to do but they decided to take me all around and make my visit a memorable one. I hope they enjoyed the day as much as I did. And a big thanks to Master Yuri Bodrov and his crew for their hospitality. It was an experience that very few will ever have."

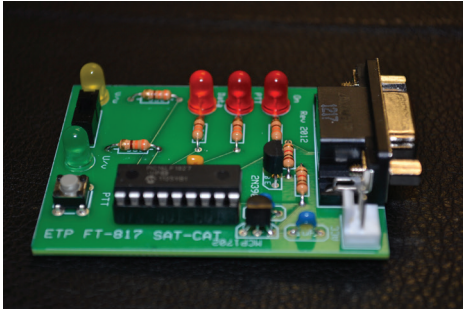


**John Papay,
K8YSE on the
deck of the MV
Barnacle**



**Captain Yuri
Bodrov, UT1FG/
MM in his shack
aboard ship.**

October 2012 QST FT-817 SatCat Interface Available From ARRL



The satellite computer aided tuning interface described in October 2012 QST (pp. 40-43) for use with SatPC32 and the Yaesu FT-817 radio is being offered for sale by the ARRL Education & Technology Program (ETP). The interface was developed by Mark Spencer, WA8SME, as part of resource development for the ARRL ETP and is priced to recover cost plus a small increment toward development as well as a cost share donation to AMSAT. The interface is fully described in the article published in October 2012 QST on pp. 40-43.

You may order the board and programmed PIC for a cost of \$20; to order the full kit including all of the parts, the cost is \$35. To order please send the following either by mail or email as follows:

- Your name and shipping address
- Phone number and email address
- Item you are requesting
- Enclose a check for the appropriate amount, payable to ARRL ETP, sent to attention of ARRL Education Services

Send orders to:

ARRL Education Services
ATTN: Amy Strickland
225 Main Street
Newington, CT 06111

Please contact Amy in ARRL Education Services at astrickland@arrl.org with any questions about ordering. For questions about the interface design and specifications contact Mark Spencer at m Spencer@arrl.org.

AMSAT is the North American distributor of **SatPC32**, a tracking program designed for ham satellite applications. For Windows 95, 98, NT, ME, 2000, XP, Vista, Windows 7.

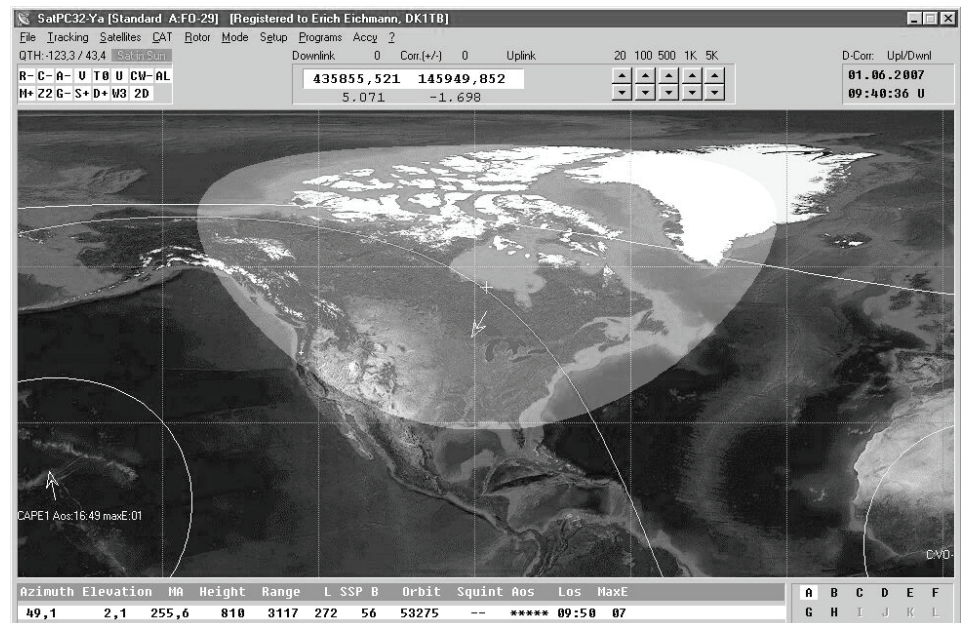
Version 12.8b is compatible with Windows 7 and features enhanced support for tuning multiple radios.

Version 12.8b features:

- SatPC32, SatPC32ISS, Wisat32 and SuM now support rotor control of the M2 RC-2800 rotor system.
- The CAT control functions of SatPC32, SatPC32ISS and Wisat32 have been expanded. The programs now provide CAT control of the new Icom transceiver IC-9100.
- The main windows of SatPC32 and SatPC32ISS have been slightly changed to make them clearer. With window size W3 the world map can be stretched (only SatPC32).
- The accuracy of the rotor positions can now be adjusted for the particular rotor controller. SatPC32 therefore can output the rotor positions with 0, 1 or 2 decimals. Corrections of the antenna positions can automatically be saved. In previous versions that had to be done manually.
- The tool 'DataBackup' has been added. The tool allows users to save the SatPC32 program data via mouse click and to restore them if necessary. After the program has been configured for the user's equipment the settings should be saved with 'DataBackup'. If problems occur later, the program can easily restore the working configuration.
- The rotor interfaces IF-100, FODTrack, RifPC and KCT require the kernel driver IOPort.SYS to be installed. Since it is a 32-bit driver it will not work on 64-bit Windows systems. On such systems the driver can cause error messages. To prevent such messages the driver can now optionally be deactivated.
- SuM now outputs a DDE string with azimuth and elevation, that can be evaluated by client programs. Some demo files show how to program and configure the client.

Minimum Donation is \$45 for AMSAT members, \$50 for non-members, on CD-ROM. A demo version may be downloaded from <http://www.dk1tb.de/indexeng.htm>. A registration password for the demo version may be obtained for a minimum donation of \$40 for members and \$45 for non-members. Order by calling 1-888-322-6728.

The author DK1TB donated SatPC32 to AMSAT. All proceeds support AMSAT.



George Carr, WA5KBH

Several months ago, I was travelling along unfamiliar territory. It was time for a hamsat pass, so I pulled over onto a nearby dirt road and set up my Arrow and Icom handheld, ready for the pass. Out of seemingly nowhere, a police looking car quickly pulled up along side of me and - quicker than a flash - an officer descended upon me. He wanted to know what I was "up to". I identified my self and answered his question. And, about that time, the pass began, so I offered to show him what I was "up to". As the pass ended, he seemed a bit more relaxed. Then, without saying a word, he pointed across the two lane highway to a large chainlink fence with concertina wire all across the top. "That there is the state pen. We don't like surprises. Next time, be more mindful of your surroundings. Why don't ya jest move along." I thanked him and left cautiously.



Be aware of your surroundings!

Help Wanted: AMSAT News Service Rotating Editor Positions Available

The AMSAT News Service (ANS) is responsible for researching, writing, editing, and publishing the weekly amateur satellite news bulletins.

With the addition of a couple of volunteers this would generally involve taking a turn about every 3 to 4 weeks.

At present we are looking for interested satellite enthusiasts to join the ANS editorial team. Professional writing/editing

On a recent summer trip to New Mexico, Jackson Wilson, KF5LOQ and my son-in-law, wanted to operate from nearby DM66. We left the family gathering, drove down the highway for about thirty minutes or so, watching for the change of gridline on the smartfone. Once in DM66, we looked for a safe place to operate. We spotted the back parking lot of a chain box store in a strip mall. We pulled in and sat in the cool air conditioning, blower on high, visiting till time for the pass to begin. We stepped out of the car only to discover that we parked adjacent to an operating rock quarry! There was not time to move and we had promised several hams a contact from DM66. The noise was horrendous. We did manage a few contacts and they heard Jackson shouting above the local QRN; but, this was far from the pleasant experience we anticipated. 🌐

experience is NOT a requirement. Your interest and enthusiasm in following and reporting on amateur radio in space will get you started! The ANS Editor team helps each other by rounding up items of interest. Plus we receive submitted items for publication ... so you won't be left all alone!

If you can commit to working on the bulletins for a week on a rotating basis please reply via e-mail to AMSAT News Service Editor Lee McLamb, KU4OS via ku4os at amsat.org. 🌐

AMSAT Awards

AMSAT Director Contests and Awards, Bruce Paige, KK5DO says congratulations are in order for our latest AMSAT Awards recipients.

The following have entered into the Satellite Communicators Club for making their first satellite QSO.

- Steven Holland, KC9TTQ
- Ron Reiter, KD8SEV
- Dan Kowell, AL7RS
- Michael Mustachia, KF5PHA
- Randy Morden, VE6RGU
- Glyn Dodwell, GM4CFS
- Joseph Fouquet, N5JF
- Mark Gearis, KG4JAG

The following have earned the AMSAT Communications Achievement Award.

- Kenneth Holland, KC9TTR, #550
- Costantino Montella, IK8YSS, #551
- Joseph Fouquet, N5JF, #552
- Anthony Sirianni, KD8OEE, #553

The following have earned the South Africa Satellite Communications Achievement Award.

- Kenneth Holland, KC9TTR, #US179
- Costantino Montella, IK8YSS, #US180
- Arnel Nebrida, DU2XXA, #US181
- Anthony Sirianni, KD8OEE, #US182
- Mark Gearis, KG4JAG, #US183

The following have earned their Robert W. Barbee, Jr. W4AMI Award.

- Theo Doty, AA5CK, #79

To see all the awards visit <http://www.amsat.org>. Bruce says this will finish up the AMSAT Awards for 2012. Get on the air and earn your AMSAT Award during 2013!

Thanks AMSAT Director Contests and Awards, Bruce Paige, KK5DO for the above information. 🌐

Bob DeVarney W1ICW

The importance of flexibility to an Olympic gymnast cannot be underestimated. To a satellite enthusiast heading towards the moon, it's pretty gosh-darned important too. Let me explain.

While it is possible to make EME contacts with your existing Oscar-10/13 class station (single CP yagi, mast-mount preamp, and 100 watts) it is certainly not easy for either you or the station you are trying to work. The lure of your first "half-million-mile QSO" is pretty strong though. At some point, you will most likely get bitten by the bug and want to do more. This is where you need to put in a lot of planning. One of the choices you will make at this stage is whether to go whole hog right up front, or upgrade your station piecemeal over time. In my case, I chose a fairly modest antenna array, dictated by several things including the potential for ice storms, (I live in Northern Vermont) potential aesthetic impact or the XYL factor as I call it, and lastly finances. I have a multitude of hobbies and have to split up a finite fun budget among them.

I chose an array of four 7-element yagis, a pair of Yaesu rotors, and a support structure of 2-inch steel pipe in lieu of a traditional tower structure. If I had to do it all over again, I would have gone with longer yagis on a short piece of tower. The reason being that I hadn't planned on doing any CW moonbounce, and now I find I would like to do more of it. My modest EME station can work probably 85 percent of the active EME stations on 2 meters, and most of the DXpeditions that have been fielded in the last 2 years. But I would like to hear a little better, and there's no substitute for aluminum there.

If you leave yourself room for growth, you can add antennas as you decide you want them. The Yaesu G-550 elevation rotor will turn at least four 9-element yagis, as long the array is well balanced. I would mention that you will want to check the balance AFTER you add in the phasing cables to each yagi, as this can add a significant amount of weight to the array, and throw the balance off to the rear. Ask me how I know this...

I currently have a 17 foot piece of schedule 40 galvanized pipe supporting my EME array, which is bracketed to a small shed type outbuilding on my property. The pipe started out the full 22 foot length, but I shortened it when I decided I did not like the amount of flex or weight in the full length. The

whole array can be lowered with a manual boat winch attached to a steel cable that is in turn attached to the mast, and I can work on the array on the ground which is a good thing for a ham who is afraid of heights. Unfortunately, the length of the mast is such that I cannot install longer yagis without replacing it, and again, we get back to the flex and weight thing. Had I planned ahead a bit more, I might have installed a couple sections of Rohn 25 and had the flexibility now to install a larger array. The point I am trying to make here is don't paint yourself into a corner... it only takes a tiny bit more planning to leave yourself room for potential growth, even if you lose interest and don't end up using it.

Where I am at is not necessarily a bad place in the grand scheme of things. I can work most of the active EME stations, and most if not all of the DXpeditions being fielded. I can confidently operate on all but the worst 4 or 5 degrade days of the month. For the money, it works wonderfully, is easy to maintain, very robust in even the worst of weather, and doesn't look too terrible either. I have since upgraded from my original commercial 350 watt amplifier to a homebrew 1 kW solid state amp. Do I have any plans to upgrade the array? Maybe. It will be a pretty significant investment for me now, as I will have to replace a lot of my existing array. For now, I just plan to get on and use it. If anyone is curious to know what my array looks like, details of the construction, or just wants to shoot the bull, feel free to email me.

Upcoming EME events

- For the most up to date info, access to a huge body of knowledge about all things EME, and a wealth of answers to questions you will undoubtedly have, I humbly suggest subscribing to the Moon-Net reflector here: <http://www.nlsa.com/nets/moon-net-help.html>
- For January 2013, the best days for EME (lowest degrade) will be from the 12th through the 16th, and again on the 28th through the 31st, with the best day on the 17th, and the worst days from the 7th through the 12th.
- For February 2013, the best days will be from the 9th through the 13th, and again on the 23rd through the 28th, with the best day being the 14th. The worst days will be from February 4th through the 8th.

VY 73 de Bob W1ICW
w1icw at myfairpoint dot net



AMSAT-DC Workshop on Portable Satellite Ground Stations

Pat Kilroy, N8PK
AMSAT Area Coordinator, MDC

The AMSAT-DC Group is planning for a Spring Workshop 2013, to take place on Saturday, March 23, at the NASA Goddard Space Flight Center in Greenbelt, Maryland. It will be a nearly all-day event.

This is a workshop for those who wish to learn more about satellite operations and develop their own portable ground station. Participants will bring their wares to assemble, show, and explain to others that which will feature one or more of the following:

- One's own laptop computer, with appropriate software installed, such as for satellite tracking, SDR receiver control, antenna control (optional), audio recording, time stamp track, and any of many other apps for example.
- The FUNcube Dongle Pro receiver or equivalent. (We will emphasize *receiving* only, and not the transmit side at this particular time.)
- One or more antennas for 146 MHz and 436 MHz, Arrow, Elk, or homebrew on a camera tripod, small mast, homebrew PVC, or handheld.
- Everything, or almost everything, ought to be designed to be powered from a regulated 12-volt DC source of your choosing. A table will be provided with a shared 120VAC wall outlet within about 50 feet.

Volunteers are invited to join the planning committee (contact Pat at n8pk@amsat.org.) Registration information will be announced by February 15 via the AMSAT News Service (ANS), and on the AMSAT Calendar of Events under <http://www.amsat.org>

The workshop cost is expected to be low (for incidental items) or free to AMSAT members. Any non-US citizen who would like to attend must contact Pat by February 15 at the latest.

Follow the links in an upcoming ANS bulletin announcement for links on how to develop your portable ground station.

To volunteer or ask questions contact Pat at n8pk@amsat.org.



A huge vote of thank-you and congratulations are in order to the organizing team lead by Dave Jordan, AA4KN and Lou McFadin, W5DID, for the success of the AMSAT Space Symposium and Annual Meeting and events over October 25 through October 29, 2012 in Orlando, Florida.

The Symposium featured:

- AMSAT Board of Directors Meeting - October 25-26
- 30th Annual 2012 AMSAT Space Symposium - October 26-27
- AMSAT Annual Group Meeting - October 27
- Field Coordinator's Annual Breakfast - October 28
- Special Tour of the Kennedy Space Center – October 29
- Field Trips to the unique SkyCraft Surplus Store in Orlando and to the Orlando Science Center hosting the traveling Star Wars exhibit.

Summary of the Board of Directors Meeting

The Board of Directors meeting on October 25-26 was open to all AMSAT members. Full details of the Board's actions and department status will be documented in the released meeting minutes in a future issue of *The AMSAT Journal*. Here is a summary of the Board's discussions. These were shared with all of the attendees at the Annual General Meeting on October 27 and are being made available to all members now via *The AMSAT Journal*.

AMSAT's Board of Directors members were all present for the meeting, as listed above.

AMSAT Board Member	Term Expires
Barry Baines, WD4ASW Westborough, MA	2013
Alan Biddle, WA4SCA Franklin, TN	2013
Drew Glasbrenner, KO4MA New Port Richey, FL	2013
Tony Monteiro, AA2TX N. Andover, MA	2013
Tom Clark, K3IO Clarksville, MD	2014
Lou McFadin, W5DID Orlando, FL	2014
Gould Smith, WA4SXM Knoxville, TN	2014
Alternate Mark Hammond, N8MH Coats, NC	2013
Alternate Patrick Stoddard, WD9EWK Scottsdale, AZ	2013

Election of AMSAT's Senior Officers was one the first orders of business completed by the Board. The positions were voted upon and filled as shown in the table, below.

AMSAT President, Barry Baines, WD4ASW presented the 2012 President's Report. To focus the discussion on AMSAT's goals and accomplishments Barry reminded us of AMSAT's Mission and Vision designed to "Keep Amateur Radio in Space"

AMSAT's Mission Statement

- AMSAT designs, builds and operates experimental satellites and promotes space education with a focus on coverage, availability, and leadership, training, and development of designers and op-

erators in technical and scientific innovation.

- AMSAT conducts strategic partnerships with NASA, ARISS in the area of promoting amateur radio in Human Space Flight, and in education through universities and foundations in the area of LEO satellite projects.

AMSAT's Vision Statement

- Deploy satellite systems with wide area continuous coverage
- Participation in human space missions
- Support a stream of LEO satellites developed in cooperation with the educational community and other amateur satellite groups.

AMSAT Board Elects Senior Officers for 2012

The following positions were voted upon and filled:

Barry Baines, WD4ASW	President
Drew Glasbrenner, KO4MA	Vice-President Operations
Gould Smith, WA4SXM	Vice President User Services
Tony Monteiro, AA2TX	Vice-President Engineering
Frank Bauer, KA3HDO	Vice-President Human Spaceflight
Mark Hammond, N8MH	Vice-President Educational Relations
Alan Biddle, WA4SCA	Secretary
Keith Baker, KB1SF/VA3KSF	Treasurer
Martha Saragovitz	Manager

These Senior Officer positions remained open at this time awaiting appointments:

Executive Vice President
Vice-President Marketing



Barry delivered the President's Report to the Board of Directors during their meeting. This was shared again with the membership during the annual general meeting. AMSAT's list of accomplishments for 2012 is impressive.

Fox Project is on schedule

AMSAT Vice-President Engineering, Tony Monteiro, AA2TX has developed a talented and motivated Engineering Team. Tony reported his team is on schedule to have AMSAT Fox-1A ready to participate in the first appropriate NASA ELaNa launch in the second half of 2013. Fox-1A was designated as priority 14 out of 33 selected in the February 2012 NASA ELaNa selection announcement. In summary, Fox-1A's design goals include:

- Fox-1 includes a U/V (mode B) FM analog transponder. Its 2 meter downlink should be even easier to hear than AO-51.
- Fox-1 is being designed so you can work it with just a dual-band HT and an "arrow" antenna.
- The telemetry data from Fox-1 will be sent on the voice downlink in the frequencies below the audible band as low-speed FSK with forward error correction.
- Fox-1 will provide an on-orbit test of a new high speed digital data mode for use on future missions.
- A free telemetry decode program, FoxTLM, will be available to decode and display the low-speed telemetry and the high speed data downlink.
- Fox-1 is designed to host a significant science payload to support future science missions that help us to get a free launch. This capability is fully utilized in our second ELaNa proposal to fly Fox-1B.



Photo 1. AMSAT President Barry Baines, WD4ASW reports the Fox-1 Project is on schedule for completion in anticipation of a potential launch opportunity in the second half of 2013.

- Fox-1 is designed to keep the FM transponder active using its solar cells in the event of on-orbit battery charging problems.

The Fox program is planned to run in two phases. Phase 1 satellites will be 1U CubeSats with an FM analog transponder and digital data up to 9600 bps. Phase 2 satellites will be 1U to 3U CubeSats with software defined radio transponders featuring linear and high performance digital modes.

Evolving Partnerships for Launch Opportunities

AMSAT has submitted a new proposal in response to NASA's announcement of the 4th ELaNa Program in August, 2012. This will provide another Fox launch opportunity. With education being one of the key requirements for selection into the ELaNa program AMSAT and Vanderbilt University are working together on a proposal

for the RadFxSat 1U CubeSat. This will be based on the Fox-1A flight spare satellite. The science payload, supporting STEM education of university undergraduate and graduate students, will be built by Vanderbilt. AMSAT will provide the avionics and radio link (including FM transponder).

Searching for Launch Opportunities

Barry reported that Tony has developed new skills in the area of grant-writing to support AMSAT's pursuit of additional launch opportunities through funding provided by the National Science Foundation. These grant applications are extremely competitive with several universities competing for a fixed sum of money. AMSAT has teamed with Auburn University and University of Alabama-Huntsville for AMSAT to provide avionics for two 3U CubeSats. Auburn University will provide spacecraft, antennas and spacecraft integration. UoA-Hunts-



ville will provide scientific payloads. AMSAT will continue to develop partnership with universities and private enterprise to find affordable launch opportunities.

AMSAT Focus on Educational Development

Recognizing the need for AMSAT to focus on education as justification for future satellite launches and placement of amateur equipment in space several key events came to fruition during 2012:

- VP-Educational Relations Appointment
- VP-Human Space Flight Appointment

VP-Education Outreach

Mark Hammond, N8MH was appointed by Barry Baines as VP-Educational Relations.

Mark is establishing relationships with ARRL and NASA Education as first steps in an evolutionary process of supporting STEM education.

Mark began an education team within AMSAT to find new opportunities to bring space communications to the classroom by working with educators to develop teacher materials. AMSAT plans collaboration with ARRL Education's Teacher Institute to help reach these goals.

Additional opportunities exist for using ARISSat-1 telemetry archives as an educational tool. New mechanisms for demonstrating space communications such as the MAREA project by ARRL's Mark Spencer, WA8SME provide opportunity for additional educational tool development.

VP-Human Space Flight

Frank Bauer, KA3HDO was appointed by Barry Baines as VP-Human Space Flight Projects.

Frank returns after 3-year "hiatus" following his retirement from NASA to provide needed leadership and energy and proper focus on the ARISS program. Frank is AMSAT's key contact in dealing with the 2013 reorganization and budget reduction impacts in NASA Education.

The evolving relationship with NASA Education includes implementation of the new ARISS School Contact Selection Process for U.S.-based schools, museums, and special events. Proposals for an ARISS contact with a crew member aboard the International Space Station are collected within specific time frames for a time slot during six month windows. NASA 'Teaching From Space' is actively engaged in evaluating school applications to meet expectations education content and planning, including curriculum integration.

Response from the educational community for ARISS contacts between November, 2012 to April, 2013 included 121 inquiries, 24 organizations submitted proposals with 11 selected.

With greater awareness of the program ARISS is now more integrated into the NASA Education Portfolio. These changes also reflect on challenges for AMSAT and ARISS to integrate amateur radio resources with schools, develop additional technical mentors to handle an increased workload, and pursue the development of additional telebridge contacts than direct contacts.

Dealing with ITAR-Legislative Interaction

The International Traffic in Arms Regulations Act (ITAR) continues to create significant constraints on AMSAT-NA's ability to work with universities and overseas AMSAT organizations because of limits regarding the sharing of technical information with foreign nationals. During 2012, legal clarification by U.S. Department of Justice and Department of State revealed that technology in the public domain can be shared. To this end, AMSAT published 155 pages of Fox-1 technical material in the 2012 Symposium Proceedings to meet the public domain requirement. This removed many limits on public technical discussion during the Symposium (due to the attendance by foreign nationals) and is expected to allow sharing of information with other AMSAT organizations going forward.

Barry Baines appointed Peter Portanova, WB2OQQ as AMSAT's Congressional Liaison. One of Peter's key activities has been to increase awareness of ITAR's impacts. As a result of meetings with various groups in Washington, D.C. during 2012 there is a growing recognition that amateur radio/university/education satellites should be withdrawn from ITAR (Dept. of State) and placed under EAR (Dept. of Commerce) as proposed in H.R. 3288.

Increased congressional awareness of AMSAT's educational satellites has lead to recommendations that this class of dual-use, unclassified technology will not require the same constraints placed on military



to closely monitor developments and coordinate actions with university and commercial satellite organizations.

AMSAT Electronic Services

The AMSAT On-line Store featuring enhanced payment security was returned to service during August, 2012. Further enhancements are continuing in an on-going process. Thank you to these members for implementing this critical cash generator for AMSAT: Joe Fitzgerald, KM1P; Alan Biddle, WA4SCA; Bruce Paige, KK5DO; Gould Smith, WA4SXM

The Board of Directors has appointed Patrick Stoddard, WD9EWK to focus on “AMSAT’s IT Future”. Patrick will review current capabilities and actions taken over past 24 months, evaluate future needs, identify potential resources, and make recommendations on next steps. Patrick’s report is expected in January, 2013.

Table 1: 2012 AMSAT Symposium Presentations	
Topic	Speaker
AMSAT @ PACIFICON 2012	E. Michael McCardel, KC8YLD
FUNcube Dongle Pro +	Howard Long, G6LVB
An Overview of the ARISSat-1 Mission	Barry Baines, WD4ASW
The Future of the ARISS Program – Transforming to Ensure Sustainment	Frank Bauer, KA3HDO
Installing the FOX-1 Build Environment on Linux	Burns Fisher, W2BFJ
The Future of CubeSat Communications: Transitioning Away from Amateur Radio Frequencies for High Speed	Bryan Klofas, KF6ZEO
Applying the Codec2 Low-Bitrate Voice Codec to Amateur Satellite Operations	Bruce Robertson, VE9QRP
An Overview of the Recent Progress of UCF’s CubeSat Program	University of Central Florida Group
A Demonstration of MAREA – the Mars-lander ARISS Robotics Exploration Activity	Mark Hammond, N8MH
Simulation of Historical and Future AMSAT Missions using NASA’s Open Source General Mission Analysis Tool	Daniel Schultz, N8FGV
A Fox Program Overview	Anthony Monteiro, AA2TX
FoxTLM – A Software Demodulator and Telemetry Display Program for the Fox-1 Satellite	Douglas Quagliana, KA2UPW/5
Radiation Mitigation for the Fox-1 Satellite	Anthony Monteiro, AA2TX
Fox Mechanical Design	Robert Davis, KF4KSS
Fox Thermal Design	Dick Jansson, KD1K
The Fox Sniffer – A low cost, low power GPS for Small Satellites	Tom Clark, K3IO
AMSAT Education and You!	Mark Hammond, N8MH
Working Satellites with a homebrew setup, Cuban Style	Hector Martinez, CO6CBF
FUNcube from AMSAT-UK Launch and early Operations	David Bowman, G0MRF
Space @ VT CubeSat Efforts	Zack Leffke, KJ4QLP; Dr. Robert McGwier, N4HY
CubeSat: High School Students Building Satellites	Maurisa Orona

2013 Goals/Expectations

Looking forward, Barry Baines summarized AMSAT’s plans for 2013:

- Focus on Project Fox Engineering
- Prepare for Fox-1 Follow-On
- ITAR:Legislative Activity in 2013
- Continue to Enhance Educational Partnerships
- ‘IT Future’
- Building awareness and support for AMSAT by reversing the membership trend, enhance the websites
- Enhance the management team by finding volunteers to fill key needs



Photo 2. L to R: Martha Saragovitz, Keith Baker, KB1SF, Roberta Cohen, WA2FRW, Mort Cohen, WA2ARS, Lou McFadin, W5DID - at the Symposium Registration Table. (AA4KN photo)



How can AMSAT Members Help?

- Recruit individuals to become members/rebuild the ‘base’.
- Recognize that satellite projects are multi-year projects that require financial support each year.
- Donate to our capital campaign for Project Fox and future opportunities in 2012 and beyond as you are able.
- Use the existing satellites—rebuild interest in amateur radio in space
- Write articles for *The AMSAT Journal*.
- Volunteer your time and talent.

AMSAT 30th Space Symposium

The long tradition to provide an annual technical forum brought satellite enthusiasts from around the world to Orlando, Florida. AMSAT is proud of the technical content of the papers presented reflecting on the inventiveness of our volunteers and the significant contribution of presenters to “advancing the radio art.” Table 1 lists the 2012 AMSAT Symposium presentations.

The submitted papers were published in the 2012 AMSAT Symposium Proceedings book. Table 2 provides a summary of this year’s excellent technical content.

It is impossible to capture in words a gathering of the size and scope of an AMSAT Symposium. We will try to show as much as possible on a printed page with the photos included here for you to enjoy.

AMSAT thanks our prize donors for the 2012 Symposium. These were drawn during the Saturday evening banquet. Check over the prize listing and keep our sponsors in mind

Table 2: 2012 AMSAT Symposium Proceedings	
Title	Author
Section A: ARISSat-1	
An Overview of the ARISSat-1 Mission	Barry Baines WD4ASW
Section B: Fox-1 Satellite	
AMSAT FOX Satellite Program	Tony Monteiro AA2TX
Radiation Mitigation for Fox-1	Tony Monteiro AA2TX
Fox CubeSat Mechanical Design	Bob Davis KF4KSS, Steve Christie
Fox-1 Thermal Design - Update	Dick Jansson KD1K
FoxTLM - A Software Demodulator and Telemetry Display Program for the Fox-1 Satellite	Douglas Quagliana KA2UPW/5
Installing The Fox-1 Build Environment on Linux	Burns Fisher W2BFJ, Bill Reid NX5R
Section C: User Equipment and Satellite Ground systems	
Add ISS Packet Operation to Your Satellite Activity	JoAnne Maenpaa K9JKM
Working satellites with a homebrew setup, Cuban Style	Hector Martinez CO6CBF
Section D: Future Satellites and New Technology	
Applying the Codec2 Low-Bitrate Voice Codec to Amateur Satellite Operations	Bruce Robertson VE9QRP
Simulation of Historical and Future AMSAT Missions using NASA’s Open Source “General Mission Analysis Tool”	Daniel Schultz N8FGV
FUNcube from AMSAT-UK, Launch and early operations	David Bowman G0MRF
The Future of CubeSat Communications: Transitioning Away from Amateur Radio Frequencies for High-Speed Downlinks	Bryan Klofas KF6ZEO, Kyle Leveque KG6TXT
The Fox Sniffer – A low cost, low power GPS for Small Satellites	Tom Clark K3IO
Section E: Satellites and Education	
Space@VT Cubesat Efforts	Bob McGwire N4HY, Zach Leffke KJ4QLP
Mars-lander ARISS Robotics Exploration Activity (MAREA)	Mark Spencer WA8SME
AMSAT Fox-1 and the NASA ELaNa Program	Tony Monteiro AA2TX
Section F: AMSAT Fox-1 Systems Engineering Documentation	
System Requirements Specification, Avionics System Design, Attitude Determination Experiment System Interface Control Documents, Software Architecture Specification, Antenna Details, IHU Software Components, Downlink Power Amplifier Prototype	

over the coming year.

Last, but certainly not least, be impressed by the 2012 AMSAT Awards Citations. This outstanding list hopes to demonstrate how our dedicated volunteers make AMSAT the best ham radio club in the world!



In the AMSAT Store ...

<http://store.amsat.org/catalog>

New 2012 oval AMSAT Fox Decal, 5" x 3". Adhesive back that will stick to your laptop or other items.



2012 AMSAT Space Symposium and Annual General Meeting Photo Album

Attending the AMSAT Space Symposium gave you the opportunity to hear and see the latest Fox-1 project information and hear of the current state-of-the-art of Amateur Radio in Space. The Symposium featured the AMSAT Board of Directors Meeting - October 25-26, the 30th Annual 2012 AMSAT Space Symposium - October 26-27, AMSAT Annual Group Meeting - October 27, Field Coordinator's Annual Breakfast - October 28 and the Special Tour of the Kennedy Space Center – October 29



Photo 3. Howard Long, G6LVB spoke about the FUNcube Dongle Pro + (AA4KN photo)



Photo 4. Dick Jansson, KD1K discussed thermal engineering considerations of Fox-1. (AA4KN photo)



Photo 5. AMSAT VP-Engineering Tony Monteiro, AA2TX gave a Fox Overview presentation and discussed launch opportunities. (AA4KN photo)

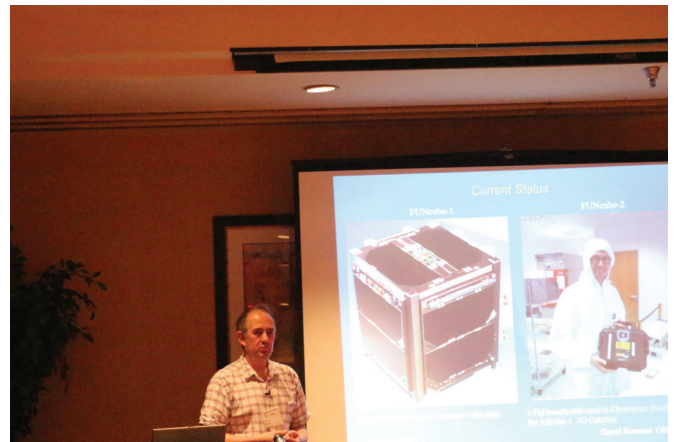


Photo 6. David Bowman, G0MRP presented on AMSAT-UK FUNCube. (AA4KN photo)



Photo 7. (left) AMSAT-VP Human Spaceflight Frank Bauer, KA3HDO discussed AMSAT's relationship and future expectations with NASA Education. AMSAT, ARISS, and ARRL will perform a bigger role going forward. (KB1SF photo)

Photo 8. (right) Robb Lapp, WB2HNP expertly moderated the presentations and master of ceremonies. (KB1SF photo)



The Symposium, the annual banquet, and informal gatherings gave AMSAT members a once-in-a-year opportunity for eyeball QSOs, discuss mission planning details with each other, receive recognition for jobs well done and catch up on Amateur Radio in Space over the past year and plan for the coming year.



Photo 9. (L-R) Tony Monteiro, AA2TX, Tom Clark, W3IO, and Bill Tynan, W3XO with the Fox-1 engineering model. (KB1SF photo)



Photo 10. (L-R) Drew Glasbrenner, KO4MA, Hector Martinez, CO6CBF, Clayton Coleman, W5PFG, and John Papay, K8YSE. (W5PFG photo)



Photo 11. AMSAT President Barry Baines, WD4ASW opened the annual banquet. (N4HY photo)



Photo 12. Guest speaker, Astronaut Sam Durrance was the keynote speaker at the AMSAT Annual Banquet. (N4HY photo)



Photo 13. (L-R) Scott Vangen, WB0QMZ organizer of Kennedy Space Center tour, Astronaut Sam Durrance, and Lou McFadin, W5DID, Symposium Co-chairman. (AA4KN photo)



Photo 14. Dave Jordan, AA4KN, Symposium Co-chairman receiving well earned recognition. (AA4KN photo)

Here are a few photos taken at the Kennedy Space Center on Monday, October 29 during the VIP tour. Our group had the once-in-a-lifetime opportunity to go inside the Vehicle Assembly Building, visit the Pad 39-A launch complex, go inside the shuttle launch control room, tour the ISS Cargo Integration facility, visit the Saturn 5 center, and see the Shuttle Atlantis.



Photo 15. Trying to capture the sheer size and majesty inside the KSC Vehicle Assembly Building. (AA4KN photo)



Photo 16. At the base of the 6 million pound crawler/transporter inside the VAB. (N8FGV photo)



Photo 17. The Shuttle Launch Control Room (N8FGV photo)



Photo 18. (above) KSC Director and astronaut Bob Cabana spent considerable time with the AMSAT group. He spoke at length about the new NASA SLS (Space Launch System) and its impact on the reconfiguration of the VAB, and how SLS will impact the future of manned space flight. (AA4KN photo)



Photo 19. (left) AMSAT group photo in front of the 39-A Launch Complex where the Shuttle was flown. At the far left are our two NASA tour guides, Scott Vangren, WB0QMZ and Shirish Patel. (4Z1WS photo)



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The complete units will be built in groups, so get your orders in early. Units will be shipped as they become available.

Minimum donations requested for various configurations:

- 1) Bare board - \$20 + S&H – no parts kits available
- 2) Populated board, serial interface - \$100 + S&H – no kit with USB unit, rotor cable and LCD available, we do have a parts list with recommended part numbers and sources.
- 3) Custom Ten-Tec Enclosure powder coat, silk-screened, drilled/punched - \$50 + S&H
- 4) Complete unit - board, USB output, rotor cable, LCD, enclosure - \$200 + S&H **our most popular

Documentation for the LVB Tracker can be found at: <http://www.LVBTracker.com>

Boards and complete units may be ordered from the AMSAT office at 301-589-6062 or from martha@amsat.org

2012 Barry Goldwater Amateur Radio Award to AMSAT's Bill Tynan, W3XO

The Radio Club of America announced that William A. Tynan, W3XO, is the recipient of its 2012 Barry Goldwater Amateur Radio Award.

The award recognizes Bill's lifelong service to the public through amateur radio. Bill was presented the award at the club's annual awards banquet in New York on November 16th. ARRL CEO David Sumner, K1ZZ, like Bill a club Fellow, was the keynote speaker.

Bill, one of AMSAT's charter members, is a past President and Chairman of the Board. For many years, he conducted QST's monthly column, "The World Above 50 MHz." He is also a past President of the Central States VHF Society. Bill played a key role in the origination of amateur radio from the Space Shuttle and the International Space Station.

Carrier Detected on LO-19 Beacon Frequency

Reports have been received that LO-19, non-operational for amateur radio use, is still transmitting a very weak continuous carrier on its former 437.1250 MHz CW Mode U TLM beacon frequency.

You might have fun listening for it, as a weak signal source. If you can hear LO-19's car-

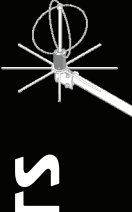
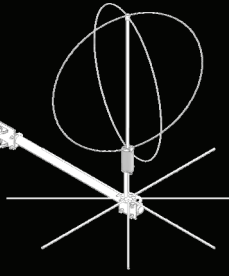
rier, your system is pretty up to snuff. Or, use some audio spectrum software and you can "see" the carrier even if you can't hear it on your speaker."

LO-19 reception reports are confirmed by N8MH, WA8SME, K8YSE, and OZ1MY.

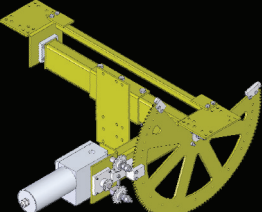


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Hector Martinez, CO6CBF traveled from Cuba to the AMSAT Symposium in Orlando. AMSAT had extended an invitation for Hector to attend and to make a presentation. Thanks to the work done by Patrick Stoddard, WD9EWK Hector was able to obtain a visa to come to the United States for the Symposium.

Once the invitation was extended, Hector had to approach both governments and file applications to get a Cuban passport and travel permit and a US visa. All expenses for his trip must be guaranteed by someone outside Cuba. Patrick took on that task personally on behalf of AMSAT, even signing legally-binding documents for the Cuban government to that end. Patrick has covered expenses out of his personal funds since no AMSAT funds were available. Before and after the Symposium radio amateurs contributed to the fund to cover the cost of Hector's trip.

To help in increasing amateur satellite activity from Cuba from Hector's station and nearby stations, Hector was given a Yaesu FT-817ND, an Elk antenna, Signalink USB interface, an az/el rotator with LVB Tracker, a FUNcube Dongle Pro, and accessories like coax cables, a 2m/70cm diplexer, and amplifiers. These items should help him improve his satellite station, and also let him work on an EME station not far from his home. One of the HTs will be used to activate another Cuban ham on the satellites.

Hector also took home an IBM ThinkPad Laptop and an Android-based phone to run apps for pass predictions, show his location using the GPS in the phone, record audio from the passes, and take photos and make videos with the phone's camera. He can make use of the GPS in his mobile phone to pinpoint his location, especially at grid boundaries.

Thanks to all the hams who gave Hector equipment to take home from the Symposium. At press time Hector confirmed that the equipment has cleared customs in Cuba and has been deployed. On December 4 Hector had his first transatlantic satellite contact via FO-29 with EA4CYQ. 🌐

Photo 20. (right) During the Symposium Hector gave a presentation, "Working the Satellites With a Homebrew Setup: Cuban Style." (N4HY photo)



Photo 21. (left) Patrick Stoddard, WD9EWK and Hector with the engineering model of the Fox-1 satellite. (photo via CO6CBF)

Photo 22. (right) Hector with AMSAT President Barry Baines, WD4ASW (W5PFG photo)

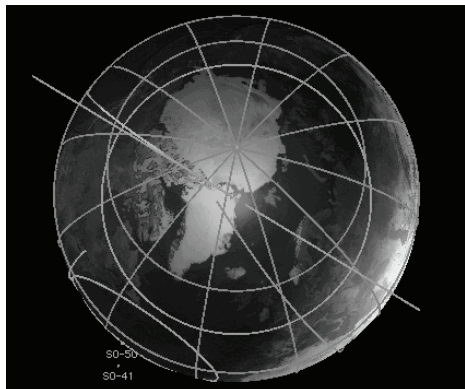


Photo 23. (left) Hector with the Space Shuttle Atlantis during the Kennedy Space Center tour. (AA4KN photo)

Hector wrote: "I wish to say thank you very much to all the hams who helped me make my dream come true. I say a special thanks to the AMSAT Board of Directors and to Patrick, WD9EWK who played an exceptional role in this!"

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Help Wanted

AMSAT needs qualified volunteers for a number of positions!

If you want to be a part of the solution in making AMSAT operational and work toward designing, building and finding a launch, WE NEED YOU!

No pay for 5+ hours per week, but a great deal of satisfaction in knowing you are helping make something happen.

We need people with these skills:

- Marketing
- Sales
- Software engineering
- Hardware engineering
- PC based software design
- Web design and maintenance
- Project management
- Documentation
- Hardware testing
- Software testing
- Hardware prototyping
- Specific area Web site information maintenance
- Video recording, digital conversion and editing
- Write technical or instructional material
- Educational activities
- Promoting AMSAT as an Area Coordinator



and any other area you think you think you can make a difference.

We often have people volunteer, but many don't deliver on their promises. So, pick an area that you think needs improvement and explain what you will do to make it better. Then do something to show that you can follow through.

Send your suggestions, actions plans and a description of why you are capable of doing this task to Gould Smith, WA4SXM, wa4sxm@amsat.org

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Titanium Donors contribute at least US \$400 per month.

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Gold Donors contribute at least US \$100 per month.

Every **Gold Donor** receives gifts of:

- ✓ Everything at the Silver Donor Level, PLUS:
- ✓ A personal invitation to the AMSAT Dayton dinner (free).

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☐ \$1200 one time

Silver Donors contribute at least US \$50 per month.

Every **Silver Donor** receives gifts of:

- ✓ Everything at the Bronze Donor Level, PLUS:
- ✓ A personal invitation to a reception with the AMSAT Directors, Officers and project designers and builders (free).
- ✓ Annual endorsement sticker after each year of donation.

☐ \$50 / month

☐ \$600 one time

Bronze Donors contribute at least US \$25 per month.

Every **Bronze Donor** receives gifts of:

- ✓ A unique "AMSAT President's Club" certificate.
- ✓ A specially designed AMSAT President's Club Donor pin.

☐ \$25 / month

☐ \$300 one time

Core Donors contribute at least US \$10 per month.

Every **Core Donor** receives gifts of:

- ✓ A specially designed AMSAT President's Club Donor pin.

☐ \$10 / month

☐ \$120 one time

Choose where your contribution should go:

☐ AO-Echo ☐ AO-Eagle ☐ ARISS ☐ Future Projects ☐ General Fund

☐ RENEW my President's Club AUTOMATICALLY every year!

☐ I prefer to make my donation in one yearly payment of \$ _____.

(Credit card only, please.)

THANK YOU!



AMSAT Thanks Our 2012 Prize Donors

Dave Jordan, AA4KN	HFT 3 1/2 inch Mini Flashlight Item 69052
AES Amateur Electronic Supply	2 ea. \$25 gift certificate
Alpha Antenna	Certificate for Alpha Sky Mobile Antenna System
American Radio Relay League	2 ea ARRL Handbook, and 2 ea ARRL Operating Manual 10th Edition, \$25 gift certificate, 20 ea. September 2012 QEX, 20 ea. National Contest Journal
Amphenol RF	10 each mil spec type N male crimp connectors along with RFX-CTL-3 crimp tool. With Certificate of compliance.
Arrow Antennas	146/437-10WBP Satellite Antenna
Bongo Ties	24 Bags of 10 and about 100 individual bongo ties
Budwig	2 each HQ-1 Antenna center connector, 2 ea. 2 pair antenna insulators
Cablexperts Inc.	CXP213C 3 Ft RG213 Jumper w PL259 Both ends; CXP08XC 18 ft. RG-8X Mini Jumper w PL259 Both ends
David Kent K4UGA	IC-910
Directive Systems	52 element loop yagi 2.3 to 2.45Ghz antenna
Elk Antennas	Elk antenna + Bag
EZNEC Antenna Software	2 ea. ENZEC Antenna Software, ver. 5.0
Flex Radio Systems	Flex 1500
Grove Enterprises, Inc. (Monitoring Times)	2ea 1 year subscriptions to Monitoring times.
Heil Sound	Pro-Sel Stereo Headphones
Howard Long	2 ea. Latest Funcube Dongle S/N 10000 & S/N 100001
HRO Ham Radio Outlet	ARRL Satellite Handbook
Kenwood USA Corporation	TS-2000
M2 Antenna Systems	Sat Pack#1 EB-144 and EB-432 and VHF/UHF Crossboom kit
MFJ	2 each MFJ 108B 24/12 hr dual clock, Practical RF Design Manual by Doug DeMaw W1FB, Morse Code book by Dave Finley N1IRZ, 2 ea. MFJ-1811 Scanner/Receiver Telescopic Antenna. 3 ea. MFJ-107B 24 hour clock
MicroLog by WA0H	1 copy Micro Log program
NCG-COMET	CTC-50M: Flat coax window jumper.
PEET Brothers Company Inc.	ULTIMETER 800 weather station. APRS ready
Quicksilver Radio Products	2 ea. Bag 30 Amp Power Poles (25Pk)
Skycraft Parts and Surplus	Universal Table vise, 2X folding magnifier, Adjustable soldering station, Helping Hands
Startek-USA	Laptop PC Cooler
Ten-Tec. Inc	Ten-Tec model 777 DX-Pro Headset, Ten-Tec hat, 2ea. Ten-Tec coffee mug,
Texas Towers	2 ea. \$50 Gift Certificate
The RF Connection	6 PC and 16 PC Screwdriver sets
VIS Radio	ARROW Antenna
W5DID	HFT 41 Piece Bit and Socket Set
West Mountain Radio	West Mountain Radio Hat
Yaesu-Vertex	FT-60R



Photo 24. Happy prize winners at the 2012 AMSAT Annual Banquet (AA4KN Photo)

2012 AMSAT Awards Citations	
Presidential Recognition for Contributions to the AMSAT Mission	
Gould Smith, WA4SXM	For your continuing management of AMSAT's presence at the Dayton Hamvention. Your involvement with all aspects of AMSAT's Dayton activities coupled with providing annual updates of your book, "Getting Started with Amateur Radio Satellites" continue to make Dayton an excellent venue for AMSAT. In addition, your support for resurrecting the AMSAT Store is appreciated.
Tony Monteiro, AA2TX	For your outstanding leadership of AMSAT's Engineering Team. In addition to guiding current development efforts of Fox-1, your efforts to cultivate relationships with universities and others to secure scientific payloads for future AMSAT spacecraft will result in providing launch opportunities for keeping amateur radio in space. You are writing the book for AMSAT on how to respond to grant opportunities.
Keith Baker, KB1SF	For your handling the duties of Treasurer, providing effective leadership in the management of AMSAT's financial resources and working with key individuals in proper accounting of AMSAT's activities. In addition, your personal interaction with DARA leadership has helped to encourage a relationship with a key amateur radio organization that continues to donate each year to AMSAT.
Alan Biddle, WA4SCA	For handling several critical responsibilities for AMSAT. As Corporate Secretary you are meticulous in handling BoD minutes and ensuring key paperwork is completed in an accurately and timely manner. Your diligence in managing the BoD election process ensures integrity of the election process. When action was needed to properly manage and encourage progress on developing the new AMSAT Store, you agreed to step in and take appropriate steps to get the task completed. Your ability to interact with key personnel made the difference.
Mark Hammond, N8MH	For guiding AMSAT's focus on education outreach. As AMSAT's primary point of contact with outside organizations, including ARRL and NASA Teaching From Space, you've established effective relationships with key personnel. You've successfully recruited key volunteers within AMSAT, encouraging volunteers to take on new tasks, such as the PACIFICON ARISS contact and building an education outreach effort at the convention in conjunction with that contact. You agreed to represent AMSAT at the AMSAT-UK Colloquium and to develop education outreach relationships with AMSAT-UK, supporting our expanding interest in educational outreach by utilizing the FUNcube satellite.
Peter Portanova, WB2OQQ	For assuming the role of AMSAT Congressional Liaison in support of AMSAT's efforts to educate key industry and governmental officials of the impacts of ITAR on AMSAT and educational institutions. Your ability to develop key points of contact and to establish lines of communication resulted in key information exchanges with industry representatives and governmental officials in 2012. Thank you for your continued representation of AMSAT at hamfests, special operating events, and other venues. You give a public face to current and potential AMSAT members.
Patrick Stoddard, WD9EWK	For championing the steps necessary to allow Hector Martinez, CO6CBF to travel to the United States as an officially invited guest of AMSAT to attend the 30th Annual Space Symposium in Orlando. Your willingness to personally commit your time and to pay for his travel expenses to make this possible, coupled with working through the numerous steps needed to gain permission from both the Cuban and US Governments to allow Hector's travel to Orlando to happen, is deeply appreciated. You have also continued to represent AMSAT at hamfests and special events. You communicate the adventure and excitement equally to both future and veteran satellite operators in person, and in your operations from remote grid squares. We thank you for your faithful service and outreach.



In Recognition of Outstanding Contributions to AMSAT Engineering This work has been essential to the development of the Fox-1 satellite project. AMSAT depends on volunteers like you to move us forward and to help keep amateur radio in space.	
Corey Abate, KD8RQI	For your efforts and contributions in the area of solar panel PCB design.
Bryan Baker, N4DTV	For your efforts and contributions in the area of RF system design.
Jonathan Brandenburg, KF5IDY	For your efforts and contributions in the area of software development.
Darell Brehm, WA3OPY	For your efforts and contributions in the area of custom RF crystal engineering & fabrication.
Jerry Buxton, N0JY	For your efforts and contributions in the area of systems engineering.
Steve Christie	For your efforts and contributions in the area of mechanical design.
Bronson Crothers, AA1ZB	For your efforts and contributions in the area of power system design.
Bob Davis, KF4KSS	For your efforts and contributions in the area of mechanical design.
Burns Fisher, W2BFJ	For your efforts and contributions in the area of software development.
Joe Fitzgerald, KM1P	For your efforts and contributions in the areas of server administration and software development. You have also made the new AMSAT Store possible. Your willingness to respond to an urgent need to get a new Store up and running allowed AMSAT to once again have a commercial presence on-line. The overall importance of your work is reflected by the number of AMSAT memberships handled and the amount of AMSAT publications, software and other materials that are processed on-line.
Marc Franco, N2UO	For your efforts and contributions in the area of RF system design.
Bdale Garbee, KB0G	For your efforts and contributions in the area of IHU processor development.
Braddock Gaskill, W3BCV	For your efforts and contributions in the area of IHU processor development.
Dick Jansson, KD1K	For your efforts and contributions in the area of thermal analysis and design.
Jim Johns, KA0IQT	For your efforts and contributions in the area of software development.
John Klingelhoefter, WB4LNM	For your efforts and contributions in the area of RF system design.
Taylor Klotz, K4OTZ	For your efforts and contributions in the area of RF system design.
Chris Lee, NT6D	For your efforts and contributions in the area of RF system design.
Keith Packard, KD7SQG	For your efforts and contributions in the area of IHU processor development.
Dan Passaro, AK4PX	For your efforts and contributions in the area of mechanical prototype development.
Larry Phelps, K4OZS	For your efforts and contributions in the area of RF system design.
David Ping, WB6DP	For your efforts and contributions in the area of antenna design.
Douglas Quagliana, KA2UPW	For your efforts and contributions in the area of software development.
Bill Reed, NX5R	For your efforts and contributions in the area of software development.
Jay Schwartz, WB8SBI	For your efforts and contributions in the area of software development.
Dan Welch, W6DFW	For your efforts and contributions in the area of prototype component fabrication.
In Recognition of Outstanding Contributions to AMSAT Educational Relations	
EMike McCardel, KC8YLD	For your commitment to AMSAT's educational mission as Associate Director of Education, and for your creative contributions to the PACIFICON 2012 Youth Lounge activities.
Joe Spier, K6WAO	For your commitment to AMSAT's educational mission as Associate Director of Education, and for your outstanding leadership and organization of the ARISS contact and related events at PACIFICON 2012.



In Recognition of Outstanding Contributions to AMSAT Educational Relations, continued	
Mark Spencer, WA8SME	For your commitment to AMSAT's educational mission, and for your tireless efforts in producing numerous beneficial educational tools such as the CubeSat Simulator, Tracking Simulator, Mars-lander ARISS Robotics Exploration Activity (MAREA), and the FT-817 Sat CAT interface.
In Recognition of Outstanding Contributions to AMSAT User Services	
Ed Long, WA4SWJ	For your nine years at the helm of <i>The AMSAT Journal</i> , retiring following the NOV-DEC 2011 issue. During this time, the <i>The AMSAT Journal</i> importance as a key benefit of AMSAT membership grew and the magazine content continued to be impressive, reflecting key advances in technology and operations as well as highlighting key achievements of the organization.
Bruce Paige, KK5DO	For continuing support of AMSAT through your management of AMSAT's Award Program as well as helping to get the new AMSAT Store properly configured. Your enthusiasm for AMSAT's Awards Program is reflected by the number of certificates that are applied for and "buzz" that the program creates. You also make the weekly Houston AMSAT Net available to operators worldwide, enhancing our sense of community.
JoAnne Maenpaa, K9JKM	For your outstanding efforts in leading the AMSAT News Service. The ANS Bulletin is a critical line of communication for AMSAT. Your efforts continue to enhance the stature of ANS as its reach continues to expand. Your efforts grew when Dee Interdonato, NB2F passed way, reducing the editorial staff and placing more workload on Lee and you. Your updates to the AMSAT web site keep it fresh and vibrant. Your willingness to maintain the standards of ANS given this challenge is appreciated.
Lee McLamb, KU4OS	For your hard work and dedication in the publication of the weekly ANS Bulletins. The ANS Bulletin has significant worldwide reach and is highly regarded for the quality of publication. When Dee Interdonato, NB2F passed away, you took on a greater workload to maintain the Bulletin's weekly publication schedule. Thank you for your dedication in support of ANS.
Ray Hoad, WA5QGD	You continue to provide key information in the weekly release of Keplerian Elements as well as serving as AMSAT's Liaison with US Space Command. Your attention to detail, coupled with timely release of element data, is an important service for many amateurs who benefit directly by your efforts.
James French, W8ISS	For your continuing release of the weekly "AMSAT Satellite Report." The material that you release helps to spread the word concerning satellite availability and modes of operation, thus encouraging greater use of amateur radio assets in space.
Chuck Pinkham, K3PER	For being an essential part of AMSAT's presence at the Dayton Hamvention. For years you have handled the routine and the unexpected, and are there from setup to takedown. Your sustained efforts have helped make this a highly successful opportunity to tell the wider amateur community the AMSAT story.
Mike Young, WB8CXO	For producing, testing and supporting the popular LVB Tracker boxes. Your coordination of the AMSAT hardware and software exhibitions at the Dayton Hamvention helps show current and future satellite operators how the new technology can be integrated into their stations.
Steve Belter, N9IP	For leading the video coverage at both Dayton and AMSAT Symposium events. Your professional production makes it possible for those who cannot be present to experience the latest information on our projects. Your support at the AMSAT booth, in whatever is needed, helps to make the professional presentation which defines AMSAT.
Rick Hambly, W2GPS	You have maintained the AMSAT web site, handling both routine and abnormal situations with equal skill. You have worked patiently with contributors, insuring that the information is current and readily available. The web site often makes the first impression of AMSAT. You have made ours a positive, professional experience.
Bob Carpenter, W3OTC	For your support of AMSAT and the AMSAT Office. Your continued work on the AMSAT member database has moved that project from an idea to a functional test bed. You are always available to solve computer or software problems that arise in the office allowing the office to run smoothly.
Bill Hook, W3QBC	For all the varied tasks you perform to keep the office running smoothly. Whether the problem is small or large, you handle it with ease and efficiency. We greatly appreciate your support.



In Recognition of Outstanding Contributions to AMSAT Human Spaceflight

Mark Steiner, K3MS	For your leadership and dedication in ensuring continued amateur radio success on ISS as the ARISS government liaison to NASA. AMSAT commends you for your dedicated, sustained, outstanding service to the ARISS team.
Dave Taylor, W8AAS	For your leadership as an ARISS Delegate and your tireless support to ARISS operations as one of the 2012 operations team leads. AMSAT especially recognizes you for your help in making the new ARISS proposal process succeed in implementation, for your efforts in coordinating the process to recruit and train new mentors, for your service as the operations team coordinator, and your service as an ARISS mentor.
Kenneth Ransom, N5VHO	For your support and leadership to ARISS as the team's NASA mission operations coordinator and payload integration lead. AMSAT commends you for your management and coordination of the ARISS contacts under very challenging circumstances, your responsive hardware technical coordination, your international coordination with the ARISS Russia team and your overall can-do attitude and spirit.
Keith Pugh, W5IU	For your support and leadership to ARISS as one of the 2012 operations team leads. AMSAT also commends you for all you have done for the ARISS program this past year, especially your phenomenal, sustained efforts in mentoring schools in preparation for their contacts. Your efforts and can-do spirit are an inspiration to us all. For many years you have represented AMSAT at hamfests and other activities. You have showed countless people that they can have fun working amateur satellites with modest equipment. You have literally weathered storms at Dayton with good humor. For many people, you are truly the first face of AMSAT.
Lou McFadin, W5DID	For your sustained leadership in all of the ARISS hardware developments. AMSAT commends you for your continued technical support of the hardware in orbit and your active participation in the ARISS Europe Ham TV payload development effort. You have also co-chaired the 30th AMSAT Space Symposium and Annual Meeting. Your enthusiasm for creating unique Space Symposium activities, such as the KSC tour, obtaining our banquet speaker, and organizing our efforts to secure prizes, are reflective of the outstanding work done by your team and you.
Charlie Sufana, AJ9N	For your superb, sustained efforts to prepare the ARISS schools through your personal guidance and mentoring as well as your long-standing efforts to keep the ARISS team in synch through your operations team record keeping. AMSAT commends you on your sustained operations service—from the first ARISS contact to today.
John Spasojevich, AG9D	For your support to the ARISS operations team through your leadership in coordinating the Echolink/IRLP feeds and your school contact mentoring efforts.
Dave Jordan, AA4KN	For your service to ARISS as a new contact mentor and your steadfast support in relaying the ARISS contact information to the general public through outstanding ARISS information releases. AMSAT also commends you for your service as the AMSAT Area Coordinator in Orlando and your support as the co-chair for the AMSAT 2012 symposium. Your close coordination with Lou McFadin, W5DID and willingness to take on tasks to ensure a successful Symposium are appreciated.
Trinesha Dixon	For your support and dedication to the educational outcomes of the ARISS program. AMSAT commends you for your key efforts in the development of new educational tools for schools, online meeting places and developing a successful, new ARISS proposal process as well as coordinating the process to recruit and train new mentors.
Debra Johnson, K1DMJ	For your support and dedication to the educational outcomes of the ARISS program. AMSAT commends you for your key efforts in the development of new educational tools for schools and developing a successful, new ARISS proposal process as well as coordinating the process to recruit and train new mentors.
Peter Kofler, IN3GHZ	For your support and leadership to ARISS as one of the 2012 operations team leads. AMSAT also commends you for all you have done for the ARISS program this past year, especially your coordination and mentoring of many of the schools in Europe. Your efforts and can-do spirit are an inspiration to us all.



In Recognition of Outstanding Contributions to AMSAT Human Spaceflight, continued

Gil Carman, WA5NOM	For your support and dedication to ARISS as the program's prime prognosticator of ISS orbital information. AMSAT commends your superb efforts, outstanding dedication and sustained orbit prediction precision which has been instrumental in the success of hundreds of school group contacts since the very start of the SAREX and ARISS programs.
Satoshi Yasuda, 7M3TJZ	For your support and leadership to ARISS as the key coordinator and mentor of all the ARISS schools in Asia and mentor of many of the ARISS schools in Japan.
Tony Hutchison, VK5ZAI	For your support and leadership to ARISS as the key coordinator and mentor of all the ARISS schools in Australia. AMSAT also commends you for your sustained support as the premier ARISS telebridge station operator. Your efforts and can-do spirit are an inspiration to us all.
Phillipe Vanhoute, ON5PV	For your dedicated support to the ARISS program as a key telebridge operator. AMSAT commends you for all you have done for the ARISS team this past year.
Rosalie White, K1STO	For your leadership as an ARISS Delegate and your sustained, tireless support of the ARISS program since the very beginning. AMSAT commends you for all you have done for the ARISS team.

In Recognition of Your Outstanding Contributions to the 2012 AMSAT Symposium

AMSAT extends its sincere thanks to you for making the Orlando, Florida meeting a great success.

Bill Tynan, W3XO	For your efforts in soliciting prizes. Your energy and focus on details to secure prizes was very successful, resulting in a myriad of prizes for this year's Symposium.
Dennis Veselka, KI4KNC	For your efforts in soliciting prizes. Your energy and focus on details to secure prizes was very successful, resulting in a myriad of prizes for this year's Symposium.
Jim Diggs, K4AHO	For your efforts in soliciting prizes. Your energy and focus on details to secure prizes was very successful, resulting in a myriad of prizes for this year's Symposium.
Daniel Schultz, N8FGV	For editing the AMSAT PROCEEDINGS once again. The PROCEEDINGS are an important component of the overall success of the Symposium, and make it possible for non-US amateurs to access the latest technical presentations.
Pete Rimmel, N8PR	For providing the recording equipment used at the key Symposium events. Having this available makes it possible for satellite operators worldwide to share the latest information and excitement.
Joe Armbruster, KJ4JIO	You have been a key supporter in making everything work. Whatever and whenever something was needed, you got it done quickly and well.
Jim Robarr, KB2CUX	Your willingness to handle volunteer transportation, and the flexibility you have showed, has been a key component in making things happen where and when they were needed.
Roberta Cohen, WA2FRW	The Symposium registration table is the first part of the Symposium which attendees encounter. You handled it with enthusiasm and ease, setting the tone for the rest of the meeting.
Robb Lapp, WB2HNP	For moderating the presentations at the Symposium. You kept things running on time with an easy touch.
Les Kramer, WA3SGZ	For arranging the tour of the Orlando Science Center. This excellent facility has great meaning to AMSAT members who have a special interest in science and technology.
Scott Vangen, WB0QMZ	You have been instrumental in arranging an AMSAT tour of the Kennedy Space Center, and in coordinating our banquet speaker. These have both been major attractions for those attending the meeting.
Dr. Samuel T. Durrance	Thank you for being the 2012 AMSAT Symposium Banquet Speaker. You have brought the wonders of science and space flight to AMSAT by graciously sharing your own out of this world experiences.



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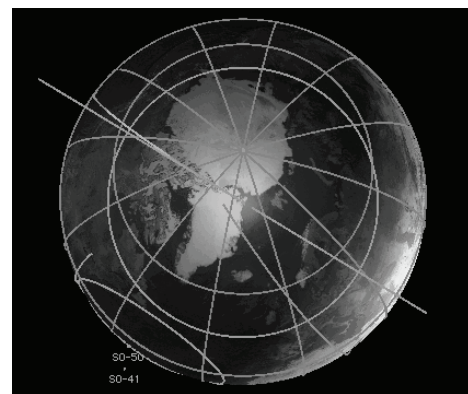
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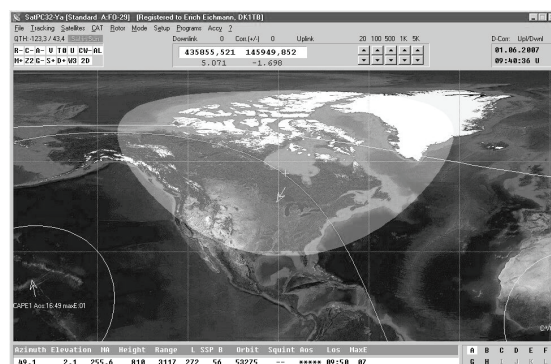


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